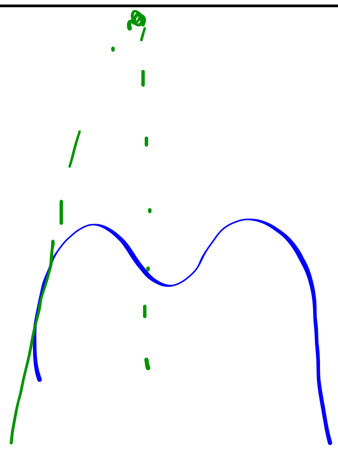
day 17

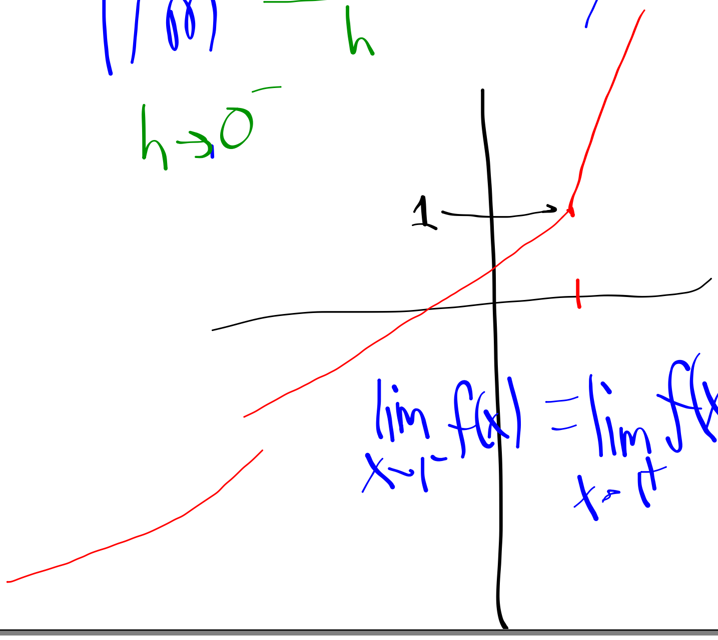


$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

Name a function that is continuous but not differentiable (at least at 1 point)

2 one sided limits that don't match

$$\overset{2}{\lim_{h\to 0^-}} \frac{f(x+h)-f(x)}{h} \neq \overset{1}{\lim_{h\to 0^+}} \frac{f(x+h)-f(x)}{h}$$



$$\lim_{x\to 1^-} f(x) = \lim_{x\to 1^+} f(x) = 1$$

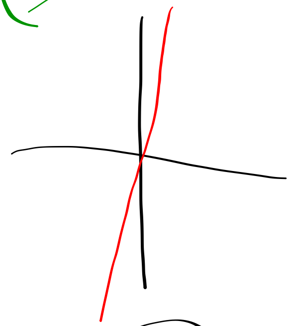
3.1/27) $f(x)=8x$; $a=\cancel{-3}\ \cancel{2}\ -1$

a)[oops] Find $f'(a)$

for a general "a"

$$f'(a)=\lim_{x\to a}\frac{f(x)-f(a)}{x-a}=\lim_{x\to a}\frac{8x-8a}{x-a}$$

$$=\lim_{x\to a}\frac{8(x-a)}{x-a}=8$$



a[REAL]) Find $f'(-3)$

$$f'(-3)=\lim_{x\to -3}\frac{f(x)-f(-3)}{x-(-3)}=\lim_{x\to -3}\frac{8x-(-24)}{x-(-3)}$$

$$=\lim_{x\to -3}\frac{8x+24}{x+3}=\lim_{x\to -3}\frac{8(x+3)}{x+3}=8$$

b) eqn of tan line $P=(-3,f(-3))=(-3,-24)$

$m=f'(-3)=8$

$y=x$

$y-(-24)=8(x-(-3))$

What if derivative does not exist at a point?

a) if lim dne because its like $\frac{\text{really not zero}}{0 \text{ ish}}$

look for a vertical tangent

b) if lim dne for any other reason

$\Rightarrow$ tangent dne

Sep 20-8:10 AM